

Phenomena of Jupiter's Satellites.						Greenwich Observations		I 48	
Day.	Satellite.	Phenomenon.	Telescope.	Power.	Mean Solar Time of Observation.	Mean Solar Time of N.A.	Observer.	IIV. 3,	
					h m s	h m			
1893 Jan.	2	III.	Tr. Ing. First contact	E. Equat.	200	8 35 53	A. C.		
	2	III.	Bisection	"	"	8 40 8	"		
	2	III.	Last contact	"	"	8 43 12	"		
	2	III. (a)	Tr. Ing. First contact	Astrographic Equat.	225	8 38 38	A. E.		
	2	III.	Bisection	"	"	8 42 7	"		
	2	III.	Last contact	"	"	8 55 5	"		
	3	I. (b)	Tr. Ing. First contact	"	"	9 0 47	C. D.		
	3	I.	Last contact	"	"	9 4 39	"		
	19	I.	Tr. Ing. Bisection	Merz. Refractor	130	7 25 25	B.		
	19	I.	Last contact	"	"	7 29 58	"		
1893 Feb.	19	I.	Tr. Ing. Last contact	E. Equat.	200	7 28 58	T. H.		
	27	I. (c)	Occ. D. Bisection	Merz. Refractor	295	6 44 30	L.		
	27	I.	Last seen	"	"	6 45 10	"		
	27	I. (d)	Occ. D. First contact	E. Equat.	200	6 40 24	H.		
	27	I.	Bisection	"	"	6 41 59	"		
	27	I.	Last seen	"	"	6 44 33	"		
	27	I. (e)	Occ. D. Last seen	Altaz.	100	6 44 19	B.		
	4	I.	Tr. Ing. First contact	Merz. Refractor	285	5 50 15	L.		
	4	I.	Bisection	"	"	5 51 58	"		
	4	I.	Last contact	"	"	5 54 14	"		

Jan. 1894.		of Jupiter's Satellites, 1893.						149
Day,	Satellite,	Phenomenon.	Telescope.	Power.	Mean Solar Time of Observation.	Mean Solar Time of N.A.	Observer.	
1893 Feb. 4	I.	Tr. Ing. First contact	E. Equat.	200	h m s 5 45 58	5 50	D. E.	
4	I.	Bisection	"	"	5 47 47		"	
4	I.	Last contact	"	"	5 49 57		"	
4	I.	Tr. Egr. First contact	Altaz.	100	8 6 25	8 5	B.	
4	I. ( <i>f</i> )	Last contact	"	"	8 8 28		"	
4	I.	Tr. Egr. First contact	E. Equat.	200	8 1 25	8 5	D. E.	
4	I.	Bisection	"	"	8 3 55		"	
4	I.	Last contact	"	"	8 6 5		"	
5	I. ( <i>g</i> )	Ecl. R. First seen	"	"	6 35 24	6 35 1	A. C.	
5	I.	Full brightness	"	"	6 36 51		"	
5	I.	Ecl. R. Full brightness	Astrographic Equat.	225	6 35 49	6 35 1	H. F.	
7	III.	Tr. Egr. First contact	E. Equat.	200	7 55 22		H.	
7	III.	Bisection	"	140	8 0 21	7 57	"	
7	III.	Last contact	"	"	8 3 31		"	
19	I.	Occ. D. Bisection	"	100	7 11 54	7 12	"	
19	I.	Last seen	"	"	7 13 49		"	
25	III.	Occ. R. First seen	"	"	6 40 28	6 44	"	
25	III.	Bisection	"	"	6 42 17		"	
25	III.	Last contact	"	"	6 44 47		"	
28	I. ( <i>h</i> )	Ecl. R. First seen	Finder of Merz. Refractor	50	6 50 58	6 50 11	L.	
28	I.	Full brightness	"	"	6 52 56		"	

Day.	Satellite.	Phenomenon.	Telescope.	Power.	Mean Solar Time of Observation. h m s.	Mean Solar Time of N.A. h m s	Observer.
1893 Feb. 28	I. ( <i>i</i> )	Ecl. R. First seen	Astrographic Equat.	225	6 50 22	6 50 11	C. D.
28	I.	Bisection	"	"	6 51 37		"
28	I.	Full brightness	"	"	6 53 22		"
Mar. 23	I.	Ecl. R. First seen	E. Equat.	100	7 4 53	7 4 27	H.
23	I.	Full brightness	"	"	7 6 52		"
23	I. ( <i>j</i> )	Ecl. R. First seen	Astrographic Equat.	225	7 5 9		C. D.
23	I.	Bisection	"	"	7 5 59	7 4 27	"
23	I.	Full brightness	"	"	7 7 9		"
July 5	I. ( <i>k</i> )	Ecl. D. Began to fade	"	"	15 2 29		"
5	I.	Bisection	"	"	15 3 29	15 3 48	"
5	I.	Last seen	"	"	15 4 21		"
22	III.	Tr. Egr. Bisection	"	"	13 48 46		"
22	III.	Last contact	"	"	13 51 40	13 54	"
22	I.	Tr. Egr. First contact	"	"	13 56 59		"
22	I.	Bisection	"	"	13 59 14	14 3	"
22	I.	Last contact	"	"	14 1 58		"
Aug. 14	I. ( <i>l</i> )	Tr. Ing. Last contact	E. Equat.	200	12 5 0	12 10	B.
14	I.	Tr. Egr. Bisection	Astrographic Equat.	225	14 18 59	14 21	C. D.
14	I.	Last contact	"	"	14 20 14		"
15	I.	Occ. R. First seen	E. Equat.	275	11 33 18	11 30	L.
15	I. ( <i>m</i> )	Last contact	"	"	11 35 57		"

Jan. 1894.

*of Jupiter's Satellites, 1893.*

151

Day.	Satellite.	Phenomenon.	Telescope.	Power.	Mean Solar Time of Observation. h m s	Mean Solar Time of N.A. h m s	Observer.
1893 Aug. 24	II.	Ecl. D. Last seen	Altaz.	100	13 38 58	13 39 41	B.
Sept. 3	III.	Tr. Ing. First contact	Astrographic Equat.	225	12 46 43		C. D.
3	III.	Bisection	"	"	12 57 11	12 51	"
3	III.	Last contact	"	"	13 9 14		"
4	II. (n)	Occ. R. First seen	Altaz.	100	10 42 12		H. F.
4	II.	Last contact	"	"	10 46 21	10 31	"
5	I. (o)	Ecl. D. Began to fade	Astrographic Equat.	225	13 36 55		C. D.
5	I.	Bisection	"	"	13 38 33	13 39 18	"
5	I.	Last seen	"	"	13 40 13		"
7	I. (p)	Occ. R. First seen	"	"	11 35 25		H. F.
7	I.	Bisection	"	"	11 36 20	11 37	"
7	I.	Last contact	"	"	11 39 10		"
11	II.	Occ. D. First contact	"	"	10 44 30	10 45	A. E.
11	II.	Last seen	"	"	10 47 14		"
14	I. (q)	Ecl. D. Last seen	"	"	10 2 5	10 1 41	C. D.
22	I.	Tr. Ing. First contact	E. Equat.	360	10 24 40		A. C.
22	I.	Bisection	"	"	10 26 21	10 26	"
22	I.	Last contact	"	"	10 28 7		"
22	I.	Tr. Egr. First contact	"	"	12 31 23		"
22	I.	Bisection	"	"	12 33 7	12 37	"
22	I.	Last contact	"	"	12 34 56		"

				Greenwich Observations			LIV. 37	
Day.	Satellite.	Phenomenon.	Telescope.	Power.	Mean Solar Time of Observation.		Observer.	152
					h m s	h m s		
1893 Sept. 23	I. ( <i>r</i> )	Occ. R. Bisection	E. Equat.	70	9 52 41	9 45	H.	
23	I.	Last contact	"	"	9 55 11		"	
25	II.	Ecl. D. Last seen	"	"	13 18 5	13 20 4	D. E.	
27	II.	Tr. Egr. First contact	"	200	11 56 22		H.	
27	II.	Bisection	"	"	11 58 47	12 1	"	
27	II.	Last contact	"	"	12 3 0		"	
30	I. ( <i>s</i> )	Occ. R. First seen	"	"	11 31 27		O. T.	
30	I.	Bisection	"	"	11 32 37	11 33	"	
30	I.	Last contact	"	"	11 34 11		"	
Oct. 4	II.	Tr. Ing. First contact	"	"	12 4 23		A. C.	
	II.	Bisection	"	"	12 7 6	12 9	"	
	II.	Last contact	"	"	12 12 0		"	
	II. ( <i>t</i> )	Occ. R. First seen	"	"	9 26 40	9 26	D. E.	
22	II.	Tr. Egr. First contact	Astrographic Equat.	225	8 10 9		C. D.	
22	II.	Bisection	"	"	8 11 43	8 13	"	
22	II.	Last contact	"	"	8 14 23		"	
22	I.	Tr. Ing. First contact	"	"	11 57 46		"	
22	I.	Bisection	"	"	12 0 11	11 59	"	
22	I.	Last contact	"	"	12 2 45		"	
22	I.	Sh. Egr. First contact	"	"	13 27 32		"	
22	I.	Bisection	"	"	13 29 13	13 30	"	
22	I.	Last contact	"	"	13 30 11		"	

Jan. 1894.		of Jupiter's Satellites, 1893.					153	
Day.	Satellite.	Phenomenon.	Telescope.	Power.	Mean Solar Time of Observation. h m s	Mean Solar Time of N.A. h m s	Observer.	
1893 Oct. 24	I. (u)	Tr. Egr. First contact	E. Equat.	200	8 29 53 }	8 36	L.	
	I.	Last contact	"	"			"	
	II. (v)	Ecl. D. Last seen	"	"	12 57 57	12 58 6	B.	
	I. (w)	Tr. Ing. Last contact	Astrographic Equat.	225	8 13 58	8 9	C. D.	
	I. (x)	Tr. Egr. First contact	"	"	10 12 39 }	10 20	D. E.	
	I.	Bisection	"	"			"	
	I.	Last contact	"	"	10 16 23	10 20	"	
	Nov. 3	III. (y)	Ecl. R. Full brightness	E. Equat.	100	10 18 33	6 40 21	A. C.
	3	III.	Occ. D. First contact	"	"	6 42 59 }	6 52	"
	3	III.	Bisection	"	"			"
3	III. (z)	Last seen	"	"	7 6 15	12 18 57	"	
6	I.	Ecl. D. Began to fade	"	"	12 11 16		L.	
6	I.	Half brightness	"	"	12 15 46	12 18 57	"	
6	I.	Quarter brightness	"	"	12 18 5		"	
6	I.	Last seen	"	"	12 19 15	12 18 57	"	
6	I.	Ecl. D. Last seen	Astrographic Equat.	225	12 19 28		A. E.	
9	I. (a')	Tr. Egr. First contact	"	"	6 25 52	6 29	H. F.	
9	I.	Bisection	"	"	6 27 57		"	
9	I.	Last contact	"	"	6 30 12	"	"	

Day.	Satellite.	Phenomenon.	Telescope.	Power.	Mean Solar Time of Observation. h m s	Mean Solar Time of N.A. h m s	Observer.
1893 Nov. 16	I.	Tr. Egr. Bisection	E. Equat.	100	8 12 14	8 13	H.
	I.	Last contact	"	"	8 13 59		"
	I.	Tr. Egr. Bisection	Altaz.	"	8 11 7	8 13	C. D.
	I.	Last contact	"	"	8 13 21		"
	I.	Occ. D. First contact	E. Equat.	"	10 28 2	10 29	L.
	I.	Last seen	"	"	10 31 6		"
	I. (b')	Occ. D. First contact	Astrographic Equat.	225	10 26 14		H. F.
	I.	Bisection	"	"	10 29 18	10 29	"
	I.	Last seen	"	"	10 30 55		"
	I. (c')	Occ. D. First contact	Altaz.	100	10 25 44		D. E.
Dec. 7	I.	Bisection	"	"	10 27 44	10 29	"
	I.	Last seen	"	"	10 29 35		"
	II.	Tr. Ing. Bisection	E. Equat.	"	8 39 57	8 42	H.
	II.	Last contact	"	"	8 42 37		"
	II. (d')	Tr. Ing. First contact	Astrographic Equat.	225	8 36 14		C. D.
	II.	Bisection	"	"	8 38 56	8 42	"
	II.	Last contact	"	"	8 41 33		"
	II.	Tr. Egr. First contact	E. Equat.	100	10 52 36		H.
	II.	Bisection	"	"	10 55 35	10 59	"
	II.	Last contact	"	"	10 59 19		"

Day.	Satellite.	Phenomenon.	Telescope.	Power.	Mean Solar Time of Observation. h m s	Mean Solar Time of N.A. h m s	Observer.
1893 Dec. 7	II.	Tr. Egr. First contact	Astrographic Equat.	225	10 50 12	10 59	C.D.
7	II.	Bisection	"	"	10 53 12		"
7	II.	Last contact	"	"	10 56 16		"
7	I.	Tr. Ing. First contact	E. Equat.	100	11 9 18	11 12	H.
7	I.	Bisection	"	"	11 11 32		"
7	I.	Last contact	"	"	11 14 42		"
7	I.	Tr. Ing. First contact	Astrographic Equat.	225	11 11 35	11 12	C.D.
7	I.	Bisection	"	"	11 13 50		"
7	I.	Last contact	"	"	11 16 29		"
7	II.	Sh. Egr. Bisection	"	"	11 56 53	12 0	"
7	II.	Last contact	"	"	11 59 2		"
9	II.	Ecl. R. First seen	E. Equat.	100	6 43 13		B.
9	II. (e')	Ecl. R. First seen	Astrographic Equat.	225	6 43 1	6 42 57	H.F.
9	II.	Bisection	"	"	6 44 46		"
9	II.	Full brightness	"	"	6 46 55		"
9	I.	Tr. Egr. Last contact	"	"	7 52 40	7 50	"
14	II.	Tr. Ing. Bisection	E. Equat.	200	10 59 9		C.D.
14	II.	Last contact	"	"	11 2 43		"



Day.	Satellite.	Phenomenon.	Telescope.	Power.	Mean Solar Time of Observation. h m s	Mean Solar Time of N.A. h m s	Observer.
1893 Dec. 14	I.	Tr. Ing. First contact	E. Equat.	200	12 56 51	12 57	C. D.
14	I.	Bisection	"	"	12 58 44		"
14	I.	Last contact	"	"	13 1 23		"
14	II.	Tr. Egr. Last contact	"	"	13 17 1	13 18	"
15	I.	Ecl. R. First seen	"	275	13 0 8	13 0 31	B.
16	II. ( <i>f'</i> )	Ecl. R. First seen	"	100	9 18 21	9 18 21	L.
16	II.	Bisection	"	"	9 19 36		"
16	II.	Full brightness	"	"	9 20 56		"
16	I.	Tr. Egr. First contact	"	"	9 32 19	9 35	L.
16	I.	Last contact	"	"	9 35 39		"
22	I.	Occ. D. First contact	"	55	11 54 11	11 56	W. B.
22	I.	Bisection	"	"	11 55 41		"
22	I.	Last seen	"	"	11 56 56		"
23	III.	Occ. R. Last contact	"	100	7 23 0	7 27	A. C.
23	II.	Occ. D. First contact	"	"	7 53 10	7 56	"
23	II.	Bisection	"	"	7 55 23		"
23	II.	Last seen	"	"	7 57 41		"
23	I. ( <i>g'</i> )	Tr. Ing. First contact	Transit Circle	195	9 9 49	9 9	"
23	I.	Last contact	E. Equat.	100	9 14 3	9 15 31	"
23	III. ( <i>h'</i> )	Ecl. D. Last seen	"	"	9 17 30		"

Jan. 1894.

of Jupiter's Satellites, 1893.

157

Day.	Satellite.	Phenomenon.	Telescope.	Power.	Mean Solar Time of Observation.	Mean Solar Time of N.A.	Observer.
1893 Dec. 30	III.	Occ. D. First contact	E. Equat.	100	h m s 9 15 15	h m 9 16	W. B.
30	III.	Bisection	"	"	9 17 0		"
30	III.	Last contact	"	"	9 19 14		"
30	I.	Tr. Ing. First contact	"	"	10 58 18		"
30	I.	Bisection	"	"	10 59 28	10 57	"
30	I.	Last contact	"	"	11 0 58		"

Notes.

(a) Image tremulous, windy. (b) A bad observation. *Jupiter* very faint; satellite almost invisible; both times uncertain.  
 (c) Very good observation. (d) Bad observation, probably late. (e) Very rough observation. (f) Bad observation.  
 (g) Good observation. (h) A good observation, at 6<sup>h</sup> 52<sup>m</sup> 12<sup>s</sup> brightness equal to, and at 6<sup>h</sup> 52<sup>m</sup> 39<sup>s</sup> brightness greater than, that of  
 Satellite IV. (i) Sky hazy. (j) Bad observation; definition very poor. (k) Nearly daylight.  
 (l) Bad definition. (m) This observation is of little value. Could get no definite limb on *Jupiter*, and the satellite was  
 very faint. Times probably half a minute late. (n) Definition very bad. Observation not worth much. (o) Definition very poor.  
 (p) Definition of *Jupiter* rather poor. (q) Definition bad. (r) Not a good observation. (s) *Jupiter's* limb rather hazy.  
 (t) Cloudy. (u) Not a good observation. Satellite seen through thin cloud. (v) Definition not good. Very hazy.  
 (w) Definition bad. (x) Definition bad. (y) Reappeared almost in contact with *Jupiter*; probably late.  
 (z) Rough observation, through a momentary break in clouds. (a') Definition poor. (b') Considered good observation. Definition  
 very good. (c') Very little use, no definition; probably late. (d') Definition poor. (e') Definition good.  
 (f') Very good observation. (g') Observed as *Jupiter* was crossing the first wire. (h') Not a good observation. Very misty.

The initials H. T., L., H., A. C., B., T. H., H. F., C. M., C. D., D. E., W. B., O. T., and A. E., are those of Mr. Turner, Mr. Lewis, Mr. Hollis, Mr. Crommelin, Mr. Bryant, Mr. Hudson, Mr. Furner, Mr. Martin, Mr. Davidson, Mr. Edney, Mr. Bowyer, Mr. Tuck, and Miss Everett respectively.

*Ephemerides of the Five Inner Satellites of Saturn, 1894.*  
By A. Marth.

Greenwich Noon, 1894.	P	L	B	B	$\Lambda - L$	Long. of Centr. Mer.	B'
Feb. 20	358°520	203°765	+13°954	+12°250	-4°485	117°54	+15°43
25	502	203°609	13°869	12°315	4°178	22°01	15°34
Mar. 2	480	203°416	13°770	12°380	3°833	286°49	15°23
7	454	203°189	13°658	12°445	3°454	190°98	15°11
12	423	202°931	13°535	12°510	3°044	95°47	14°97
17	389	202°646	13°402	12°575	2°607	359°95	14°83
22	353	202°337	13°261	12°640	2°146	264°42	14°67
27	358°315	202°008	13°113	12°705	-1°666	168°88	14°51
Apr. 1	275	201°664	12°961	12°770	1°170	73°32	14°34
6	233	201°310	12°806	12°835	0°663	337°73	14°17
11	191	200°950	12°651	12°900	-0°151	242°11	14°00
16	149	200°589	12°497	12°965	+0°362	146°46	13°83
21	108	200°233	12°347	13°029	0°870	50°76	13°67
26	068	199°885	12°203	13°094	1°370	315°02	13°51
May 1	358°029	199°550	+12°066	+13°159	+1°858	219°23	+13°36
6	357°992	199°232	11°938	13°243	2°328	123°39	13°22
11	958	198°936	11°821	13°287	2°776	27°49	13°09
16	927	198°665	11°717	13°351	3°200	291°54	12°97
21	899	198°421	11°626	13°415	3°596	195°53	12°88
26	875	198°207	11°550	13°479	3°962	99°46	12°79
31	854	198°026	11°490	13°542	4°295	3°34	12°73
June 5	357°837	197°881	11°447	13°606	+4°593	267°16	12°68
10	824	197°772	11°420	13°669	4°855	170°92	12°65
15	816	197°700	11°411	13°732	5°080	74°63	12°64
20	812	197°666	11°419	13°795	5°267	338°29	12°65
25	812	197°670	11°445	13°858	5°415	241°90	12°68
30	817	197°713	11°488	13°921	5°525	145°46	12°73
July 5	826	197°794	11°548	13°984	5°597	48°98	12°79
10	357°840	197°913	+11°624	+14°047	+5°631	312°46	+12°87

P denotes the position-angle of the axis of *Saturn*;  $L + 180^\circ$  the planetocentric longitude of the Earth referred to the assumed